IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	Conf. No: 8229
Peter NORD et al	Art Unit: 1791
Application No: 10/579,374	Examiner: Stephen K. Ko
Filed: May 12, 2006	Docket: OUTT.3475

For: APPARATUS AND METHOD FOR REMOVING DEPOSITS CREATED IN ELECTROLYTIC REFINING

BRIEF ON BEHALF OF APPELLANT

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

REAL PARTY IN INTEREST

The real party in interest is Outotec Oyj, formerly known as Outokumpu Technology Oy.

RELATED APPEALS AND INTERFERENCES

There is no other prior or pending appeal, interference, or judicial proceeding known to appellant, the appellant's legal representative, or assignee which is related to, directly affects, or is directly affected by or has a bearing on the board's decision in this appeal.

STATUS OF CLAIMS

Claims 1-35 have been filed. Claims 1-22 and 35 have been canceled prior to the final rejection. Claims 23-34 have been finally rejected. In a reply filed August 25,

2009 to the final rejection, amendments for claims 30 and 32 were proposed and claims 33 and 34 were canceled. Claims 23-32 are currently pending.

STATUS OF AMENDMENTS

The Advisory action mailed September 10, 2009 indicates that the amendments proposed in the reply that was filed August 25, 2009 would be entered.

SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter relates to an apparatus and method for removing a deposit accumulated in electrolytic refining on a surface of an electrode, and to a method of removing a metal deposit accumulated in electrolytic refining on a surface of a cathode.

In production of metals, such as copper, by electrolytic refining, the metal is deposited electrolytically on a surface of a cathode plate that is suspended in a tank of electrolyte. The metal that is deposited on the cathode plate, generally to a thickness greater that 5mm, adheres strongly to the cathode plate and is periodically removed from the cathode plate. The metal is stripped as plate-like elements from the surfaces of the cathode plates. The machine that is used for stripping the plate-like elements from the surfaces of the cathodes should detach each plate-like element reliably from the cathode in one piece without damaging the cathode or insulation provided on the edges of the cathode.

US Patent No. 4,840,710 (Middlin et al) discloses a method and apparatus for removing a copper deposit from a cathode plate by restraining the upper and lower edges of the cathode plate against horizontal movement and then employing hydraulic rams to press against the composite cathode (cathode plate plus copper deposit) between the upper and lower edges so that the composite cathode bends alternately to one side and the other to a sufficient degree to exceed the adhesion bond strength of the copper deposit which then separates from at least the upper part of the cathode plate. The hydraulic rams always apply force at the same height. The apparatus shown

by Middlin et al is subject to disadvantage because of the stress applied to the cathode plate.

The subject matter of this application is an apparatus and method for removing a deposit accumulated in electrolytic refining on the surface of an electrode. As set forth in claim 23, the apparatus comprises a support structure (corresponding to the support structure 10 referred to at page 4, lines 26-27 in the case of the embodiment described with reference to the drawings) for supporting the electrode (corresponding to the cathode 1 referred to at page 4, line 24) substantially stationarily in a generally vertical orientation (page 5, line 1). The support structure includes at least one element (the support element 8 or 9) for restraining a lower edge of the electrode against horizontal movement, and at least one support element (6 or 7) for restraining an upper edge of the electrode against horizontal movement. See page 4, line 29 to page 5, line 2 and FIGS. 1 and 2. At least one stripping element (13) is turnable about a horizontal axis spaced from the electrode and has an end that is spaced from the horizontal axis and moves vertically relative to the electrode during turning of the stripping element and engages the deposit on the surface of the electrode intermediate the lower and upper edges of the electrode. See pages 5, lines 10-19 and FIGS. 1 and 2. A control element (15) is coupled drivingly to the stripping element for turning the stripping element, whereby cooperation of the stripping element and the elements for restraining the lower and upper edges of the electrode against horizontal movement causes bending of the electrode. See page 5, lines 10-12 and page 6, lines 4-5 and 13-15.

The method set forth in claim 32 comprises supporting the electrode substantially stationarily in a generally vertical orientation (page 5, line 1), restraining upper and lower edges of the electrode against horizontal movement (page 4, line 29 to page 5, line 2 and FIGS. 1 and 2), providing at least one stripping element that is turnable about a horizontal axis spaced from the electrode, and turning the stripping element about the horizontal axis (page 5, lines 10-19 and FIGS. 1 and 2), whereby an end of the stripping element that is spaced from the horizontal axis engages the deposit on the surface of the electrode intermediate the lower and upper edges of the electrode and moves

vertically relative to the electrode and causes bending of the electrode (page 5, lines 10-12 and page 6, lines 4-5 and 13-15).

Claim 32, as now amended, is further limited by virtue of the fact that the claim specifies that the deposit is a metal deposit on a surface of a cathode (page 3, lines 4-7).

Thus, in accordance with both claim 23 and claim 32, the electrode is supported in a vertical orientation and is subject to bending by contact with the stripping element moving vertically relative to the electrode. The location at which bending force is applied to the electrode moves vertically as the stripping element turns.

Appellant believes that the only elements of claim 23 or claim 32 that would be considered a means plus function or a step plus function within the meaning of 35 USC 112, sixth paragraph, are the "support structure for supporting the electrode substantially stationarily in a generally vertical orientation," the "at least one element for restraining a lower edge of the electrode against horizontal movement," and the "at least one element for restraining an upper edge of the electrode against horizontal movement," all in claim 23.

The structure corresponding to the recited function of the "support structure" is the support structure 10 (FIGS. 1 and 2, page 4, line 27). The structure corresponding to the recited function of the "at least one element for restraining a lower edge of the electrode against horizontal movement," is the support elements 8, 9 (FIGS. 1 and 2, page 4, line 30). The structure corresponding to the recited function of "at least one element for restraining an upper edge of the electrode against horizontal movement," is the support elements 6, 7 (FIGS. 1 and 2, page 4, line 30).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claim 30 has been rejected under 35 USC 112, first paragraph as failing to comply with the written description requirement.

Claims 23, 24, 26-28 and 30-35 have been rejected under 35 USC 103 over US Patent No. 4,595,421 (Redhead et al) in view of US Patent No. 4,840,710 (Middlin et al).

Claims 23-34 have been rejected under 35 USC 103 over Canadian Patent Application No. 2,164,910 (CA '910) in view of Middlin et al.

ISSUES

1. Whether the examiner was correct in rejecting claim 30 under 35 USC 112, first paragraph.

2. Whether claim 30, as now amended, complies with the written description requirement of 35 USC 112, first paragraph.

3. Whether the examiner was correct in rejecting claims 23, 24, 26-28 and 30-35 under 35 USC 103 over Redhead et al in view of Middlin et al.

4. Whether the examiner was correct in rejecting claims 23-34 under 35 USC 103 over CA '910 in view of Middlin et al.

ARGUMENT

1. The rejection of claim 30 under 35 USC 112, first paragraph has been rendered moot by the amendment of that claim.

2. Claim 30, as now amended, is not open to rejection under 35 USC 112, first paragraph.

The only specific objection raised by the examiner in support of the rejection was to the reference to a "power cylinder" on the basis that the specification as originally filed does not refer to a power cylinder. The specification as originally filed states in the sentence starting at page 6, line 5, that the control element may be a slewing cylinder or a hydraulic cylinder and claim 30, as now amended, recites that the control element is a cylinder. Appellant submits that the subject matter of claim 30 is described in the

specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention, namely apparatus as recited in claim 23, wherein the control element is a cylinder.

3a. The subject matter of claim 23 would not have been obvious to a person of ordinary skill in the art in view of the disclosure of Redhead et al and Middlin et al.

Redhead et al is not concerned with removing a metal that has been electrolytically deposited on a cathode. Redhead et al is concerned with removal of lead slimes from anodic surfaces in a process for the electrolytic refining of lead and with removal of manganese dioxide layers (also known as scale) from anodic surfaces in a zinc electrowinning process. See column 1, lines 23-56 and column 7, lines 41-49. Redhead et al teaches that these relatively loosely adhering layers can be efficiently dislodged by use of a power driven rotating member to which is attached a plurality of radially projecting elastomeric fingers of the type used in poultry plucking machines. See column 4, lines 35-39. Redhead et al acknowledges that the mechanism by which the poultry plucking fingers are so effective is not understood (column 4, lines 65-66). However, Redhead et al explains that in operation of the apparatus, the tip of a finger is brought into contact with the removable layer 20 of slime or scale. As the finger impacts on to the layer 20, the finger bends and flexes and digs into the layer, causing a build-up of material in front of the finger. As the finger moves further, the build-up breaks away, leaving a cleaned surface. See column 7, lines 20-25.

It therefore appears that the slime or scale Redhead et al, the coating is much softer and less cohesive than the metal deposit that is accumulated in electrolytic refining and adheres less firmly to the anodic surface, and that an apt explanation for the efficacy of the mechanism is that the poultry plucking fingers scrape the frangible layer from the anodic surface.

Redhead et al does not suggest that the rotating elastomeric fingers cause bending of the anodic surface.

Middlin et al, on the other hand, is concerned with a method of stripping electrolytically deposited copper from a cathode plate by bending the cathode plate repeatedly until the upper edge of the copper deposit detaches from the cathode plate, and then forcing a wedge 13 between the copper deposit and the cathode plate to complete the separation. The copper deposit adheres firmly to the cathode and is evidently stiff, cohesive and self-supporting, since otherwise the wedge 13 that is forced between the copper deposit and the cathode plate would not separate the deposit from the cathode plate in one piece but would simply cause the copper deposit to bend or crumple.

In connection with the rejection of claim 23 over Redhead et al in view of Middlin et al, the examiner considers that the rotatable member 10 shown in FIG. 5 of Redhead et al is an apt counterpart for the stripping element recited in claim 23, and argues that it would have been obvious in view of Middlin et al to modify the apparatus of Redhead et al by providing at least one element for restraining a lower edge of the electrode of Redhead et al against horizontal movement and at least one element for restraining an upper edge of the electrode against horizontal movement, and that cooperation of the stripping element and the elements for restraining the lower and upper edges of the electrode against horizontal movement would cause bending of the electrode of Redhead et al to enhance cleaning efficiency.

Although both Redhead et al and Middlin et al are concerned with removing material from electrodes employed in an electrolytic process, the specific applications of Redhead et al and Middlin et al are quite different. In the case of Redhead et al, the deposits are frangible and adhere relatively loosely to the anodic surface of an electrode, and are removable by flexible poultry plucker fingers that scrape the deposit from the electrode. Middlin et al, on the other hand, is concerned with removing a sheet of copper that adheres firmly to the cathode sheet and is too hard and cohesive to be affected significantly by a scraping mechanism of the kind shown by Redhead et al. Applicant submits that because the deposit of Redhead et al is relatively loose and non-cohesive, bending of the electrode would not effect separation of the deposit from the

electrode. On the contrary, appellant submits that the slime or scale of Redhead et al would continue to conform to the configuration of the underlying metal surface in the event that the anode were bent in the manner contemplated by Middlin et al. Thus, although the slime or scale is removed effectively by the scraping action of the flexible fingers, adhesion of the slime or scale to the anodic surface would not be disrupted by bending of the anode. Therefore, a person of ordinary skill in the art would see no advantage to employing a mechanism for bending the electrode in the apparatus of Redhead et al.

In the advisory action mailed September 10, 2009, the examiner observed that the current claims are not restricted to the deposit having particular physical characteristics (hard and cohesive or soft and non-cohesive) and suggests that this has a bearing on whether the disclosure of Redhead et al may properly be applied to Middlin et al. Appellant submits that the scope of appellant's claims is not relevant to the inquiry into whether it would have been obvious to apply the disclosure of Redhead et al to the apparatus or method of Middlin et al. The scope of appellant's claims only comes into play when asking whether the result of combining the disclosures is a method or apparatus in accordance with the claimed subject matter. Thus, a person of ordinary skill in the art who is aware of the disclosures of both Redhead et al and Middlin et al must determine what these combined disclosures teach or suggest without reference to appellant's claims (i.e. without benefit of hindsight). In this case, the copper deposit of Middlin et al is clearly disclosed as being cohesive, essentially rigid, and firmly attached to the steel cathode sheet, whereas the anode slime or scale of Redhead et al can be scraped from the lead alloy anode by a brush-like structure composed of flexible poultry-plucker fingers. A person of ordinary skill in the art would immediately see that the two different requirements, of detaching a copper deposit from a steel cathode sheet and scraping slime or scale from a lead alloy anode, require different solutions and would not be induced to apply the teaching of Middlin et al regarding bending of the steel cathode sheet to the lead alloy anode of Redhead et al.

In the advisory action, the examiner also argued that it would have been obvious to modify the apparatus of Redhead et al by adding a mechanism for bending the electrode such that the modified apparatus can clean different kinds of electrodes successfully, hence enhancing the cleaning efficiency for cleaning different electrodes. Thus, the examiner appears to suggest that the modified apparatus may be used either for removing anode slime or scale from a lead alloy anode or for removing a copper deposit from a stainless steel cathode. The record does not show that a facility for recovering copper by electrolytic deposition on a steel cathode plate, as disclosed by Middlin et al would also have a need for apparatus for removing anode slime or scale from a lead alloy anode. Therefore, a person of ordinary skill in the art would see no benefit to be gained by modifying the apparatus or method of Middlin et al in view of the disclosure of Redhead et al. Since the mechanism for removing frangible anode slime or scale disclosed by Redhead et al (scraping) is different from the mechanism for removing a cohesive copper deposit from a stainless steel cathode plate as disclosed by Middlin et al (repeated bending of the composite cathode), appellant submits that modifying the apparatus disclosed by Redhead et al in the manner suggested by the examiner would result in apparatus that would be deficient both for removing anode slime or scale from a lead alloy anode and for removing copper deposits from a stainless steel cathode. A person of ordinary skill in the art would not make the modification suggested by the examiner.

Redhead et al describes the surfaces from which the scale or slime is removed as a lead sheet anode (in the case of manganese dioxide scale) and a lead anodic surface (in the case of a lead slime). According to Middlin et al, the hydraulic ram 10, for example, presses against the middle portion of the cathode 1 until the cathode flexes, but without exceeding the elastic limit of the cathode. See column 1, lines 36-37. Thus, the stainless steel cathode plate undergoes elastic deformation. The present record does not show that a lead sheet anode or an anodic lead surface can be flexed by an amount exceeding the strength of the adhesion bond between the layer of manganese dioxide scale (or the lead slime) and the lead sheet anode (or anodic lead surface) without exceeding the elastic limit of the lead sheet anode (or anodic lead surface).

For this reason also, a person of ordinary skill in the art would not modify the apparatus of Redhead et al in the manner suggested by the examiner.

Appellant therefore submits that the subject matter of claim 23 would not have been obvious to a person of ordinary skill in the art in view of Redhead et al and Middlin et al, whether taken singly or in combination.

3b. The subject matter of claim 32 would not have been obvious to a person of ordinary skill in the art in view of the disclosures of Redhead et al and Middlin et al.

The examiner's argument in support of the rejection of the method claim 32 over the combined disclosures of Redhead et al and Middlin et al is essentially the same as the argument in support of the rejection of claim 23. Thus, the examiner argues that Redhead et al teaches a method comprising certain steps of claim 32. The examiner acknowledges that Redhead et al does not teach or disclose the steps of supporting the electrode substantially stationarily in a generally vertical orientation, restraining upper and lower edges of the electrode against horizontal movement, and causing bending of the electrode, but argues that it would have been obvious to a person of ordinary skill in the art to modify the method of Redhead et al in view of Middlin et al by providing the steps of supporting the electrode substantially stationarily in a generally vertical orientation, restraining upper and lower edges of the electrode against horizontal movement, and having the stripping element press against the electrode to cause bending to enhance separation between the deposit and the electrode, thus improving cleaning efficiency. Since the amendment of claim 32, whereby the features of claim 35 have been added, has been entered, appellant takes note that in connection with the rejection of claim 35, the examiner asserts that both Redhead et al and Middlin et al teach removing metal from a cathode. Although Redhead et al refers at column 1, lines 10-22 to removal of metals from a cathodic surface, this is presented in counterpoint to the subject matter that is actually disclosed by Redhead et al, which is removal of slime or scale from an anodic surface. From a comparison of the paragraph starting at column 7, line 41, with the paragraph starting at column 1, line 23, it is evident that the method disclosed by Redhead et al is concerned with cleaning anodic surfaces. Thus,

the disclosure in Redhead et al regarding use of a rotatable member is concerned with removal of nonmetallic material from anodic surfaces, and modifying the method of Redhead et al in the manner suggested by the examiner would not be a method of removing a metal deposit accumulated on a surface of a cathode.

The arguments presented above in support of claim 23 are generally applicable to claim 32 also.

Appellant therefore submits that the subject matter of claim 32 would not have been obvious to a person of ordinary skill in the art in view of Redhead et al and Middlin et al, whether taken singly or in combination.

3c. The rejections of claims 33-35 under 35 USC over Redhead et al in view of Middlin et al have been rendered moot by cancellation of those claims.

4a. The subject matter of claim 23 would not have been obvious to a person of ordinary skill in the art in view of the disclosures of CA '910 and Middlin et al.

CA '910 discloses that in the process of electrowinning of zinc, manganese dioxide scale may be removed from a silver-lead anode by use of a skeleton drum mechanism including rollers that impinge on the scale. The prior art discussed in CA '910 at page 3, lines 23-37 includes use of flexible poultry plucking fingers as disclosed by Redhead et al. Thus, like Redhead et al, CA '910 is concerned with apparatus for cleaning a frangible, pliant, relatively loosely adhering deposit from an anode. For similar reasons to those discussed above in connection with the rejection over Redhead et al in view of Middlin et al, appellant submits that bending of the anode shown by CA '910 would not effect separation of the scale from the anode and therefore a person of ordinary skill in the art would see no advantage to employing a mechanism for bending the electrode in the apparatus disclosed by CA '910.

The arguments presented above in response to the rejection of claim 23 over Redhead et al and Middlin et al apply to the rejection over CA '910 and Middlin et al. Thus, appellant submits that it would not have been obvious to a person of ordinary skill

in the art to modify the apparatus of CA '910 in the manner suggested by the examiner because (a) adhesion of scale to the anode would not be disrupted by bending of the anode, (b) removing manganese dioxide scale from an anode requires a different mechanism from detaching a copper deposit from a steel cathode sheet, (c) the record does not show that a facility for recovering copper by electrolytic deposition on a steel cathode plate would also have a need for apparatus for removing manganese dioxide scale from a silver-lead anode, and (d) the record does not show that a silver-lead anode can be flexed by an amount exceeding the strength of the adhesion bond between a layer of manganese dioxide scale and a silver-lead anode without exceeding the elastic limit of the silver-lead anode. Therefore, the subject matter of claim 23 would not have been obvious to a person of ordinary skill in the art in view of CA '910 and Middlin et al, whether taken singly or in combination.

4b. The subject matter of claim 32 would not have been obvious to a person of ordinary skill in the art in view of the disclosures of CA '910 and Middlin et al.

The arguments presented above in response to the rejection of claim 23 over CA '910 and Middlin et al are generally applicable to the rejection of claim 32 over CA '910 and Middlin et al. In addition, the arguments presented above in response to the rejection of claim 32 over Redhead et al and Middlin et al are generally applicable to the rejection of claim 32 over CA '910 in view of Middlin et al. Appellant therefore submits that the subject matter of claim 32 would not have been obvious to a person of ordinary skill in the art in view of CA '910 and Middlin et al, whether taken singly or in combination.

4c. The rejections of claims 33 and 34 under 35 USC 103 over CA '910 in view of Middlin et al have been rendered moot by cancellation of those claims.

5. Appellant has shown above that the subject matter of the independent claims 23 and 32 is not disclosed or suggested by Redhead et al and Middlin et al, whether taken singly or in combination, or by Redhead et al and CA '910, whether taken

singly or in combination. Therefore, claims 23 and 32 are patentable, and it follows that the dependent claims also are patentable.

CONCLUSION

In view of the foregoing, appellant submits that all claims of record are patentable and requests that the board should reverse the final rejection and direct allowance of this application.

Respectfully submitted,

/John Smith-Hill/
John Smith-Hill
Reg. No. 27,730

Chernoff, Vilhauer, McClung & Stenzel, LLP
601 SW Second Ave. Ste. 1600
Portland, OR 97204

Tel. (503) 278-3334
Fax (503) 228-4373

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APPENDIX OF CLAIMS

1-22 (cancelled)

23. Apparatus for removing a deposit accumulated in electrolytic refining on a surface of an electrode, comprising:

a support structure for supporting the electrode substantially stationarily in a generally vertical orientation, at least one element for restraining a lower edge of the electrode against horizontal movement, and at least one element for restraining an upper edge of the electrode against horizontal movement,

at least one stripping element that is turnable about a horizontal axis spaced from the electrode, the stripping element having an end that is spaced from the horizontal axis and moves vertically relative to the electrode during turning of the stripping element and engages the deposit on the surface of the electrode intermediate the lower and upper edges of the electrode, and

a control element coupled drivingly to the stripping element for turning the stripping element,

whereby cooperation of the stripping element and the elements for restraining the lower and upper edges of the electrode against horizontal movement causes bending of the electrode.

24. Apparatus according to claim 23, wherein the stripping element includes a sliding element at the end of the stripping element for engaging the surface of the electrode.

25. Apparatus according to claim 24, wherein the sliding element is a roller.

26. Apparatus according to claim 23, wherein the support structure includes elements for restraining the lower edge of the electrode against horizontal movement in two opposite directions perpendicular to the lower edge of the electrode and elements for restraining the upper edge of the electrode against horizontal movement in two opposite directions perpendicular to the upper edge of the electrode.

27. Apparatus according to claim 26, comprising first and second stripping elements for engaging opposite respective surfaces of the electrode, each stripping

element having an end and being turnable about a horizontal axis that is spaced from the electrode and is substantially parallel to the upper and lower edges of the electrode.

28. Apparatus according to claim 27, wherein each stripping element is provided at its end with a sliding element.

29. Apparatus according to claim 28, wherein the sliding element is a roller.

30. Apparatus according to claim 23, wherein the control element is a cylinder.

31. Apparatus according to claim 23, wherein the control element is a motor.

32. A method of removing a metal deposit accumulated in electrolytic refining on a surface of a cathode, comprising:

supporting the cathode substantially stationarily in a generally vertical orientation,

restraining upper and lower edges of the cathode against horizontal movement,

providing at least one stripping element that is turnable about a horizontal axis spaced from the cathode, and

turning the stripping element about the horizontal axis, whereby an end of the stripping element that is spaced from the horizontal axis engages the deposit on the surface of the cathode intermediate the lower and upper edges of the cathode and moves vertically relative to the cathode and causes bending of the cathode.

33-35 (canceled)

EVIDENCE APPENDIX

(none)

RELATED PROCEEDINGS APPENDIX

(none)